UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/009,004	05/07/2002	Richard L. Gregory	7037-405	2124

7590 04/10/2007

Kenneth A Gandy
Woodard Emhardt Naughton Moriarty & McNett
Bank One Center/Tower Suite 3700
111 Monument Circle
Indianapolis, IN 46204

EXAMINER	
CHOWDHURY, IQBAL HOSSAIN	
ART UNIT	**PAPER NUMBER**
1652	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/10/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/009,004	GREGORY, RICHARD L.	
	Examiner	Art Unit	
	Iqbal H. Chowdhury, Ph.D.	1652	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 January 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *11-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/5/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This application is a 371 of PCT/US00/11992.

Claims 1-20 are currently pending in the instant application.

The preliminary amendment filed on 1/15/2007 is acknowledged.

Applicant's election without traverse of Group I claims claim(s) 1-10, drawn to a method for controlling dental caries comprising administering purified SmaA protein or amylase-binding protein in the communication filed on 1/15/2007 is acknowledged. Claims 11-20 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention.

Claims 1-10 are under consideration and are present for examination.

Priority

Acknowledgement is made of applicants claim for priority of provisional application 60/132,312 filed on 5/3/1999.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 4/5/2006 is acknowledged. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is considered by the examiner. The signed copy of IDS is enclosed herewith.

Drawings

Drawing submitted on 11/5/2001 is being accepted by the Examiner.

Claim Objections

Claims 1 and 9 are objected to in the recitation "SmaA"; abbreviation without at least once fully setting forth what they are used for. Appropriate correction is requested.

Claims 4 and 10 are objected to in the recitation "non- immunogenic", which should be replaced with "non-immunogenic". Appropriate correction is requested.

Claims 3 and 5 are objected to in the recitation "amylase- binding", which should be replaced with "amylase-binding". Appropriate correction is requested.

Claims 5-7 are objected to in the recitation "including". Examiner suggests replacing that term with the more appropriate term "comprising". Appropriate correction is requested.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites, "fragment thereof", the scope of which is unclear. It is not clear whether the phrase means it is a fragment of any or all amylase-binding protein or whether it is limited to the amylase-binding protein of smaA protein. Claims 9-10 are also rejected as being dependent upon claim 1. Clarification is requested.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1-10 are directed to a method for controlling dental caries comprising administering purified SmaA protein or amylase-binding protein or fragment thereof.

The Court of Appeals for the Federal Circuit has recently held that a "written description of an invention involving a chemical genus, like a description of a chemical species, 'requires a precise definition, such as by structure, formula [or] chemical name,' of the claimed subject matter sufficient to distinguish it from other materials." University of California v. Eli Lilly and Co., 1997 U.S. App. LEXIS 18221, at *23, quoting Fiers v. Revel, 25 USPQ2d 1601, 1606 (Fed. Cir. 1993). To fully describe a genus of genetic material, which is a chemical compound, applicants must (1) fully describe at least one species of the claimed genus sufficient to represent said genus whereby a skilled artisan, in view of the prior art, could predict the structure of other species encompassed by the claimed genus and (2) identify the common characteristics of the claimed molecules, e.g., structure, physical and/or chemical characteristics, functional characteristics when coupled with a known or disclosed correlation between function and structure, or a combination of these (paraphrased from *Enzo Biochemical*).

University of Rochester v. G.D. Searle & Co. (69 USPQ2d 1886 (2004)) specifically points to the applicability of both *Lily* and *Enzo Biochemical* to methods of using products, wherein said products lack adequate written description. While in *University of Rochester v. G.D. Searle & Co.* the methods were held to lack written description because not a single example of the product used in the claimed methods was described, the same analysis applies wherein the product, used in the claimed methods, must have adequate written description (see *Enzo* paraphrase above).

Thus, Claims 1-10 are directed to a method for controlling dental caries comprising administering any purified SmaA protein or any amylase-binding protein or fragment thereof. Claims are thus drawn to a process of using any SmaA protein or any amylase-binding protein or fragment thereof for controlling dental caries, wherein said proteins' structures are not fully described in the specification. No information, beyond the characterization of the SmaA proteins having binding ability with amylase and having the amino acid sequence of SEQ ID NO: 6, which would indicate that applicants had possession of the claimed genus of any SmaA protein or any amylase-binding protein or any fragment thereof. The specification does not contain any disclosure of the structure of all the mutants or variants of any SmaA protein or any amylase-binding protein or any fragment thereof used in the method of the claim. The genus of polypeptides used in the method is a large variable genus including mutants and variants, which can have wide variety of structures. Therefore, many structurally unrelated polypeptides are encompassed within the scope of the method. The specification discloses the structure of only a single representative species (amylase-binding protein of Streptococcus mutans) that can be used in the claimed method, which is insufficient to put one of skill in the art in possession of the

attributes and features of all species within the claimed genus. Therefore, one skilled in the art cannot reasonably conclude that applicant had possession of the claimed invention at the time the instant application was filed.

Applicant is referred to the revised guidelines concerning compliance with the written description requirement of U.S.C. 112, first paragraph, published in the Official Gazette and also available at www.uspto.gov.

Claims 1-10 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a method for controlling dental caries comprising administering or using as oral composition of amylase-binding protein isolated from S. mutans and having the amino acid sequence of SEQ ID NO: 6, does not reasonably provide enablement for a method for controlling dental caries comprising administering or using as oral composition comprising any SmaA protein or any amylase-binding protein isolated from any source or any fragment thereof including mutants , variants and recombinants of SEQ ID NO: 6. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, **to make and use the claimed invention** commensurate in scope with these claims.

Claims 1-10 are so broad as to encompass a method for controlling dental caries comprising administering or using as oral composition of any SmaA protein or any amylase-binding protein or any fragment thereof including mutants, variants and recombinants of SEQ ID NO: 6. The scope of the claims is not commensurate with the enablement provided by the disclosure with regard to the use of extremely large number of amylase-binding proteins broadly encompassed by the method of the claim. Since the amino acid sequence of a protein determines its structural and functional properties, predictability of which changes can be tolerated in a

protein's amino acid sequence and obtain the desired activity requires a knowledge of and guidance with regard to which amino acids in the protein's sequence, if any, are tolerant of modification and which are conserved (i.e. expectedly intolerant to modification), and detailed knowledge of the ways in which the proteins' structure relates to its function. However, in this case the disclosure is limited to the use of a single SmaA protein comprising amino acid sequence of only one amylase-binding protein isolated from S. mutans i.e. SEQ ID NO: 6.

While recombinant and mutagenesis techniques are known, it is not routine in the art to screen for multiple substitutions or multiple modifications, as encompassed by the instant claims, and the positions within a protein's sequence where amino acid modifications can be made with a reasonable expectation of success in obtaining the desired activity/utility are limited in any protein and the result of such modifications is unpredictable. In addition, one skilled in the art would expect any tolerance to modification for a given protein to diminish with each further and additional modification, e.g. multiple point mutations or substitutions.

The specification does not support the broad scope of the claims which encompass a method for controlling dental caries comprising administering or using an oral composition comprising any SmaA protein or any amylase-binding protein or any fragment thereof because the specification does **not** establish: (A) regions of the protein structure which may be modified without affecting amylase-binding ability; (B) the general tolerance of amylase-binding protein to modification and extent of such tolerance; (C) a rational and predictable scheme for modifying any amylase-binding protein's amino acid residues with an expectation of obtaining the desired biological function; and (D) the specification provides insufficient guidance as to which of the essentially infinite possible choices is likely to be successful.

Thus, applicants have not provided sufficient guidance to enable one of ordinary skill in the art to make and use the claimed invention in a manner reasonably correlated with the scope of the claims broadly including a method for controlling dental caries comprising administering or using an oral composition of any SmaA protein or any amylase-binding protein or any fragment thereof. The scope of the claims must bear a reasonable correlation with the scope of enablement (In re Fisher, 166 USPQ 19 24 (CCPA 1970)). Without sufficient guidance, determination of a method of controlling dental caries using any SmaA protein or any amylase-binding protein or any fragment thereof to use in the claimed method having the desired biological characteristics is unpredictable and the experimentation left to those skilled in the art is unnecessarily, and improperly, extensive and undue. See In re Wands 858 F.2d 731, 8 USPQ2nd 1400 (Fed. Cir, 1988).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogier et al. (A 40-kilodalton cell wall protein-coding sequence upstream of the sr gene of Streptococcus mutans OMZ175 (serotype f), Infect Immun. 1991 May; 59(5): 1620-6, see IDS) and Rogers et al. (Identification and analysis of a gene (abpA) encoding a major amylase-binding protein in Streptococcus gordonii, Microbiology. 1998 May; 144 (Pt 5): 1223-33, see IDS). Instant claims are drawn to a method for controlling dental caries comprising administering purified amylase-binding protein or fragment thereof into oral cavity or as a composition such as mouthwash, dentifrice or chewing gum.

Ogier et al. teach a Streptococcus mutans surface protein, which is the same protein as disclosed by the instant application that interacts with salivary glycoprotein i.e. amylase, inherently an amylase-binding protein isolated from Streptococcus mutans surface proteins. Ogier et al. further teach cloning the gene and expression of said protein followed by purification. Ogier et al. suggest that Streptococcus surface protein i.e. amylase-binding protein could be important against dental caries. Ogier et al. do not teach direct treating of dental caries by administering or by using as composition such as mouthwash, dentifrice or chewing gum.

However, Rogers et al. teach a major amylase-binding protein from oral Streptococci, which bind salivary enzyme alpha amylase. Rogers et al. also teach cloning the gene and expression of said protein followed by partial purification. Rogers et al. further teach that the interaction between amylase-binding protein and salivary amylase may be important in dental

plaque formation and metabolism, which thus contributing to the initiation and progression of dental caries and periodontal disease, the two most common plaque-mediated diseases. Rogers et al. suggests that the knowledge of the nature of amylase-binding proteins may provide a better understanding of the role of these proteins in the colonization of S. gordonii in the oral cavity. Rogers et al. do not teach using said amylase-binding protein or fragments or composition such as mouthwash or dentifrice or chewing gum for treating dental caries.

By combining the teachings of Ogier et al. with that of Rogers et al., it would have been obvious to one to ordinary skill in the art at the time of the invention was made to use the amylase-binding protein of Ogier et al. and use the suggestion of Rogers et al. to use such amylase-binding protein to study the role of such protein in colonization of Streptococci.

One of ordinary skill in the art would have been motivated to use said protein since S. mutans is known to more commonly colonize oral cavities of humans leading to dental caries. One of the ordinary skill in the art would have also been motivated to break the interaction of Streptococcus and amylase through the amylase binding protein by introducing extracellular amylase-binding protein, which would inhibit the interaction of Streptococci and amylase, thereby reducing the dental caries.

One of ordinary skill in the art would have a reasonable expectation of success because Ogier et al. characterize the SmaA protein from S. mutans and Rogers et al. clearly teach that the interaction of Streptococci and amylase on the dental surface is mediated by the interaction of bacterial cell wall amylase-binding protein and amylase.

Therefore, above references render the claims 1-10 *prima facie* obvious to one of ordinary skill in the art.

Conclusion

Status of the claims:

Claims 1-20 are pending.

Claims 11-20 are withdrawn.

Claims 1-10 are rejected.

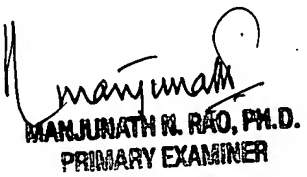
No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Iqbal Chowdhury whose telephone number is 571-272-8137. The examiner can normally be reached on 9:00-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ponnathapu Achutamurthy can be reached on 703-272-0928. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Iqbal Chowdhury, PhD, Patent Examiner
Art Unit 1652 (Recombinant Enzymes)
US Patent and Trademark Office
Rm. REM 2B69, Mail Box. 2C70
Ph. (571)-272-8137, Fax. (571)-273-8137



IC